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THE SEED-CORN SITUATION.

BY

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THE SEED-CORN SITUATION.

INTRODUCTION.

With about the same regularity that corn-planting time arrives it is found that in some portion or portions of the United States the corn that must be used for seed will not germinate well and that good yields can not be expected, because good seed of adapted strains does not exist.

With the assistance of the various State agricultural experiment stations a general survey was made of the seed-corn situation in the spring of 1912. This situation was found somewhat more serious than usual because it was more general and because it affected large portions of many of the leading corn-producing States. Aside from the lack of proper precaution in selecting and saving seed corn, which is the principal cause, the bad situation can be attributed to summer drought, frequent and prolonged fall rains, and unusually cold weather in November. Some sections endured all these unfavorable conditions.

In general, the southeastern portion of the United States produced in 1911 a much better corn crop than the average, and sufficient corn that will grow is available for spring planting in that section.

New York, Pennsylvania, Ohio, Indiana, Michigan, Wisconsin, Minnesota, and North Dakota produced a better corn crop than the average, but in these States there is very little corn fit to plant except that which was gathered early and well cared for. This seed was gathered and dried in September and is in almost perfect condition, but is very limited in quantity in comparison with the supply needed.

In the leading corn-producing States of Illinois, Iowa, and Missouri summer droughts caused the crop to be below the average and the fall rains and November freezes injured or destroyed for seed purposes all corn that was not gathered and dried early. As in the Northern States, the seed which was gathered and dried early bids fair to produce a good crop, but is entirely insufficient to plant the usual corn acreage of these States.

The drought was especially severe in the Great Plains, and all of the States from South Dakota south produced much less than a

normal corn crop. In large portions of these States no corn was produced and no acclimated and well-adapted seed exists except very insufficient quantities held over from the previous season.

GENERAL SEED-CORN SITUATION IN THE SPRING OF 1912.

A very serious situation arises when, at planting time, farmers find that their corn will not germinate well—that it is unfit for seed. In the spring of 1912 the farmers throughout the greater portion of several of the leading corn States found themselves in this costly predicament, which is exceedingly critical, because it prevails over such large areas of the principal corn-producing States.

In 1911 summer droughts were quite general throughout the United States, though small areas were relieved by local rains. The drought was broken late in the summer by frequent rains. In many sections frequent fall rains kept the corn green and sappy till severe freezes came. In portions of certain Central and South Central States there was no seed corn, because the corn crop was entirely destroyed by drought. In many Central States good seed was scarce because the crop was poor. In many Northern States the corn crop was better than the average, but good seed was unusually scarce at planting time.

GENERAL SITUATION CRITICAL, BUT NOT UNUSUAL.

The seed-corn situation in the spring of 1912 furnishes a most valuable lesson to farmers of all parts of the United States. In certain localities, where little trouble is ordinarily experienced in obtaining seed corn that will germinate well, none was obtainable at planting time, while in other localities, where conditions unfavorable to seed corn are frequent and where farmers exercise more precautions, good seed corn existed.

Unquestionably the acre yield for 1912 will be reduced in many States, owing to the planting of poorly preserved or poorly adapted seed corn. In the aggregate the loss will be immense, but much of it will never be attributed to this factor, because well-adapted, well-preserved seed was not available for demonstrating its value in comparison with that planted. The cause of corn being unfit for seed is commonly attributed to exceptional weather conditions. Such conditions may sometimes be the cause, especially in the North, but delay in selecting seed or the growing of varieties maturing too late is usually the true cause. Exceptional weather conditions occur every year, sometimes in one locality and sometimes in another. It is because many autumns are long and dry that the habit is formed of waiting till October to select seed corn.

The writer's experience in Nebraska will illustrate this point. In assisting in addressing farmers on corn trains in 1905, emphasis was placed upon seed-corn preservation and experimental results were given to show that good preservation sometimes increases productiveness by 18 bushels per acre. The experiments were conducted in the East and the general opinion prevailed among the Nebraska speakers, as well as among Nebraska farmers, that seed preservation was of little importance in Nebraska. Frequent statements were made that the autumns were long and dry and seed corn needed no special care. In contrast to this, corn trains, operated throughout the State of Nebraska in the spring of 1912, carried the following news to farmers:

> There are very few localities in the State where more than half of the ears will grow, and in many places not more than 1 ear out of 10 will grow. A very hard freeze the first week in November killed or greatly weakened a large majority of the corn which was not of an early variety or which had not been picked and properly cared for before that time. With the facts before us it becomes quite a problem to know just where the seed will come from for planting the Nebraska cornfields. For the entire State a decreased yield of 5 bushels per acre, due to a poor stand, would result in a total decreased harvest of 32,500,000 bushels of corn. At 50 cents a bushel this amounts to a loss of $16,250,000.
>
> The farmers who gathered their seed in September or early October and had it dried out before the freezes came are the ones who have good seed. These are the only farmers in so far as the station has been able to learn who have seed that they can depend upon.

MEANS OF PREVENTING SUCH SITUATIONS.

When advice is given it should be the best advice possible. The usual advice given for meeting poor seed-corn situations is to test separately the germination of each ear. The objection to this advice is the likelihood that the practice will become a yearly habit, being recommended by good authorities as the best possible procedure. Why not gather and dry the seed early and thus prevent the deplorable situation? This will not only make the testing unnecessary but will retain full productiveness—productiveness which the germination test can not restore or even reveal. Spring carefulness, no matter how great, can not make up for fall neglect. The situation is due to a lost opportunity. The way to meet properly these oft-recurring losses is to begin at the beginning and prevent them. Ten times more advice has been given regarding germination tests and methods of getting out of bad seed-corn situations than has been given regarding methods of keeping out of them. Such conditions are easily prevented in the fall, but can not possibly be rectified in the spring. Twelve years' experience in selecting seed of hundreds of varieties of corn and testing its germination teaches that seed that matures properly and is well preserved will germinate well. And what is of

much more importance, it will yield well if the variety is a good-yielding acclimated variety.

The planting of poor seed corn is an exceedingly costly and unnecessary yearly occurrence.

Exceedingly costly? Yes. Each acre of the hundred million acres grown annually would produce several bushels more if planted with early-selected well-preserved seed. The loss from the planting of neglected seed corn amounts to millions of dollars each year.

Unnecessary? Absolutely. This loss is easily prevented by (1) the use of acclimated and adapted varieties, (2) earlier selection, and (3) good care of seed corn.

By the application of these three principles the writer has seen a number of farmers double the profits from their corn crops.

USE OF ACCLIMATED AND WELL-ADAPTED STRAINS.

The advice to meet these poor seed-corn situations by preventing them is given with the knowledge that they can under all conditions be prevented. It is the only sound advice that can be given as applicable to all conditions. Farmers in localities that have no seed corn because last year the season was too dry or too short can prevent the recurrence of this condition by saving early each fall a supply of seed corn sufficient for two or three years' planting. Good seed corn well cared for will retain good germination and high productivity for three or four years.

If there has been a failure of the corn crop in a locality for several years in succession, it is good evidence that poorly adapted varieties are being grown and that great loss is being sustained in not growing crops from better adapted seed. Most farmers have observed the superiority of well-adapted varieties. This is well demonstrated when good home-grown seed is planted in comparison with seed imported from a distance. In sections having no home-grown seed because of the entire failure of crops, imported seed is planted and the decreased yield is not noticed because there is no possibility of planting home-grown seed for comparison.

Splendid opportunities for observing the value of home-grown seed were brought out in two series of 5-year tests conducted by the Office of Corn Investigations in cooperation with 28 State experiment stations. Equivalent lots of seed were grown each year at all the stations. The point of value from the five years' work is that a variety stood high or low in rank according to its adaptation or lack of adaptation to the locality in which the test was made. Varieties producing best at home often produced poorest when tested under other environments, notwithstanding the same seed of all varieties was used in all the tests.

A variety, a native of Sabina, Ohio, was taken 50 miles north and grown for five years at Sunbury, Ohio. Equivalent lots of Sabina-grown seed and Sunbury-grown seed were then tested at both points. At Sabina the Sabina-grown seed produced better by 47 per cent. At Sunbury the Sunbury-grown seed produced better by 11 per cent. Acclimatization and adaptation alone can account for these differences, and in this case the acclimatization and adaptation to Sunbury conditions had been brought about in five years. By being grown five years at Sunbury the variety had become adapted to Sunbury conditions and at the same time had lost its adaptation to Sabina conditions. The same variety constantly grown under Sabina conditions retained its adaptation to Sabina conditions.

To make certain of always obtaining the greater productiveness of adapted varieties it is necessary to save sufficient seed for two or three years' planting. In localities where extreme weather conditions may make the corn crop an entire failure this practice is of the utmost importance. It is plainly impossible to acclimate and adapt varieties if all seed is destroyed occasionally, making new importations of seed necessary. There are occasional instances in which imported seed produces better than home-grown seed. Such cases are experienced especially in the Southern States, where dry summers permit early-maturing northern-grown varieties to escape the summer drought. For this reason northern-grown seed is preferred in some sections. A better practice would be to select and acclimatize an earlier maturing variety. It would then escape the summer droughts and by becoming acclimated and adapted would produce better than imported seed.

RETENTION OF SUFFICIENT SEED FOR TWO OR THREE YEARS' PLANTING.

Even in sections where the corn crop is not likely to be an entire failure it is advisable during good corn seasons to retain sufficient seed for two or three years' planting. Careful tests have shown that seed that grew under favorable conditions is more productive than seed of exactly the same strain grown under unfavorable conditions. The greatest hindrance to corn breeding in some localities is the dissimilarity of seasons. The corn plant is exceedingly adaptive, but occasional wet seasons prevent a strain from adapting itself to droughty conditions and occasional dry seasons prevent acclimatization and adaptation to humid conditions. If the corn is poor in quality because of an unusually dry or an unusually wet season, no seed should be saved and that grown during a more normal season should be planted.

A mistaken idea prevails regarding the "running out" of corn because it has been grown too long in a locality. A strain of corn

may run out, but the cause is with the farmer and is not because the corn has been grown too long in the same locality. The longer a corn is grown in the same locality the better adapted it becomes to the conditions of that locality, provided seed is saved each normal season from the best-producing individuals.

EARLIER SELECTION OF SEED CORN.

Great progress has been made in recent years in a more general adoption of fall selection instead of spring selection of seed corn, but there is room for still greater progress. Nearly all farmers should select their seed corn three or four weeks earlier than they do. In the South seed corn should be selected and dried during August, in the North early in September, and no prudent corn farmer anywhere in the United States will allow October 15 to pass without having sufficient seed for at least one year's planting stored where it can not be injured by unfavorable or unexpected weather conditions. Where a seed patch is not maintained and seed must be selected from the general field it should be selected before the corn is cut and shocked. Where corn is husked from the standing stalk the seed should be selected several weeks before the corn is dry enough to husk and crib.

It is doubtful whether the governor of each of the corn-producing States could issue a more valuable proclamation each year than one proclaiming a suitable week for all farmers of the State to gather and dry seed corn.

As an excuse for not having good seed it is customary to state that the season was exceptional. Such seasons will continue to occur, and the only way to escape loss is by being prepared each year for an exceptional year. Last year was a very adverse season in South Dakota, Nebraska, and some other corn States; consequently this spring it is necessary to import seed corn into these sections. Nevertheless, well-acclimated and unquestionably higher yielding seed could have been selected last September from fields in these same States. This statement is made with full knowledge of the facts, because at that time such seed was selected and dried in those very sections and is now practically perfect and germinates 100 per cent. Having personally assisted in the gathering and drying of seed corn in these sections in September, the writer knows that large quantities of seed could have been saved at that time from the same and many other fields. Unfortunately, however, most farmers postponed the selection until freezing weather, with the consequence that the seed they selected will not yield well and most of it will not even germinate well. It is not the season so much as the man.

Mr. Edgar Brown, in charge of the Seed Laboratory of the United States Department of Agriculture, has reported an average germination of 81 per cent for 1,708 samples of corn intended for seed in

the spring of 1912 and obtained from farmers of various States, as shown in Table I.

TABLE I.—*Results of germination tests of seed corn intended for use in the spring of 1912.*

State.	Number of samples.	Lowest germination.	Average germination.
		Per cent.	*Per cent.*
Virginia	113	5	90.3
Kentucky	69	26	89.8
Missouri	151	2	88.7
Maryland	41	30	87.1
Iowa	141	20	85.4
Pennsylvania	144	0	84.2
West Virginia	55	8	82.5
Kansas	66	0	82.0
Ohio	189	10	80.7
Illinois	175	0	79.8
Indiana	108	0	79.0
Minnesota	106	0	76.1
Michigan	86	1	75.0
Wisconsin	88	0	73.9
Nebraska	100	30	73.1
South Dakota	57	1	64.6
North Dakota	19	0	56.8
Total	1,708	.....	81.0

The Seed Laboratory also tested the seed gathered and dried early by men of the Office of Corn Investigations. From the States mentioned 73 samples gave an average germination of 98 per cent. (See Table II.)

TABLE II.—*Results of germination tests of seed corn gathered by men of the Office of Corn Investigations.*

State.	Number of samples.	Lowest germination.	Average germination.
		Per cent.	*Per cent.*
Virginia	29	95	98.5
Maryland (including the District of Columbia)	26	93	98.3
Kansas	1	97	97.0
Ohio	4	93	94.8
Wisconsin	2	97.6	98.8
South Dakota	1	96	96.0
South Carolina	9	96	98.0
California	1	100	100.0
Total	73	.....	98.1

There are usually a few days between the time the corn stops growing and the coming of heavy frosts, especially if an acclimated corn is grown. We would have better corn yields and make better progress in originating and acclimatizing higher yielding strains of corn for different localities if seed corn were as readily killed by frosts as are sweet-potato vines. If seed corn would not stand so much abuse and if it were killed outright by the first freeze, farmers would dry their seed corn before they dig their potatoes and the next year's crop would be better.

The blame can not be justly shifted upon the season. It is the farmer who fails to do his part. Corn has been transported from a land of perpetual summer, where the returning wet season permitted

the seed to germinate without having endured winter conditions. It has been introduced into northern localities where the winters are severe. It has shown a remarkable ability to adapt itself to short summers, but is dependent upon man to care for its seed during the winter. Without this care the corn crop would not perpetuate itself in the United States. Our first duty in giving the crop opportunity to yield well is early selection and good preservation of the seed.

GOOD CARE OF SEED CORN.

Good methods of caring for seed corn are described in Farmers' Bulletin 415, entitled "Seed Corn." It has been demonstrated that the early-fall use of seed-corn racks such as are illustrated in that

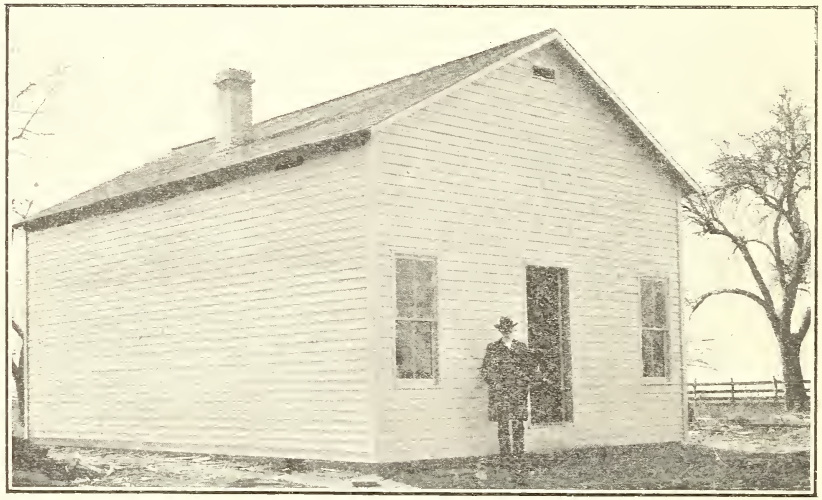

FIG. 1.—Exterior view of a building constructed solely for the good preservation of seed corn. It has a concrete basement and flue. Warm air passes from the basement through openings in the floor, ascends through the corn, and escapes through ventilators.

bulletin will increase the acre yield of corn by several bushels on practically all farms. The initial cost is very slight, and the racks will last a lifetime and are easily put out of the way when not in use. Fortunately, with care good seed can be dried and stored at very little expense. But it must not be supposed that the returns will not warrant an expense, for it is doubtful whether another investment can be made that will bring as great a profit as an investment in caring for seed corn. A community seed-corn house could be operated to great advantage. However, what is everybody's business is apt to be attended to by nobody in particular. The sure way for a farmer to avoid using his land and labor in planting seed of reduced productiveness is by selecting his seed early and caring for it well. It is not

the cost price of good seed that makes this care necessary. Five dollars a bushel is a good investment for acclimated and well-preserved seed corn, but usually at planting time such seed can not be purchased at any price. Some few localities have conscientious, careful seed-corn men. They are of great value to their communities and fortunately their number is increasing.

The experiments conducted by the Office of Corn Investigations in demonstrating the profits to be derived from the good preserva-

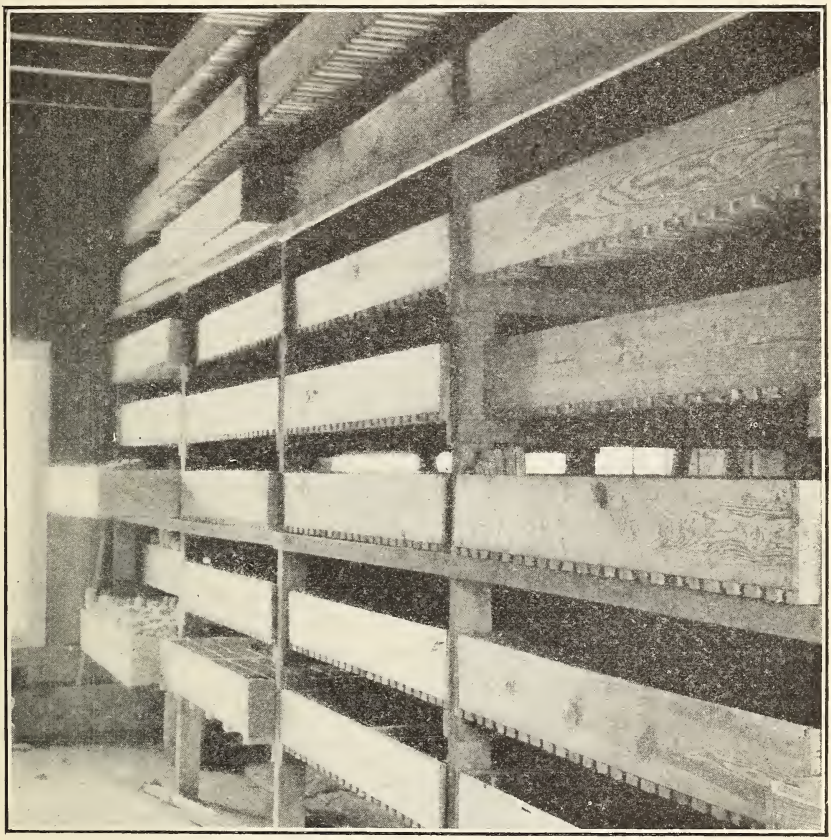

FIG. 2.—Interior view of the seed-corn dry house shown in figure 1.

tion of seed corn have been put to practical, accurate, and extensive tests. In figures 1 and 2 are shown exterior and interior views of a seed-corn dry house constructed at a cost of $500. In 1910 this seed-corn house returned to the farm $1,500 in profit, due to a 5-bushel increased acre yield on 740 acres planted with seed corn dried and stored in it. These figures were obtained as the result of 17 separate tests, practically all of which told the same story. The tests con-

ducted by the Office of Corn Investigations were intensive and accurate. Hand planting and thinning were practiced in order to reduce all rows to exactly the same number of stalks. The results show practically a 5-bushel increase per acre due to good seed preservation. Like many farmers the owner of the farm was not fully satisfied with small plat work. He therefore made more extensive tests. At corn-gathering time in November he selected 2 bushels of seed, placing 1 bushel in a crib and the other bushel in the seed-corn dry house. In the spring with a 2-row planter he planted four rows 1,280 feet long and 3¼ feet apart with the seed kept in the dry house; then four rows with the seed kept in the crib. This he repeated seven times, making eight tests in all in which four rows planted with one lot of seed were compared with the adjoining four rows planted with the other lot of seed. At harvest time four rows yielded a wagon load of ears, which constituted a weighing. The result is shown in Table III.

TABLE III.—*Comparison of the yield of seed corn stored in a dry house with that in a crib.*

Corn-row number.	Ears produced—	
	From seed kept in dry house.	From seed kept in crib.
	Pounds.	*Pounds.*
1, 2, 3, 4	2,270	
5, 6, 7, 8		2,115
9, 10, 11, 12	2,240	
13, 14, 15, 16		2,095
17, 18, 19, 20	2,100	
21, 22, 23, 24		2,045
25, 26, 27, 28	2,050	
29, 30, 31, 32		1,845
33, 34, 35, 36	2,025	
37, 38, 39, 40		1,765
41, 42, 43, 44	1,930	
45, 46, 47, 48		1,730
49, 50, 51, 52	1,820	
53, 54, 55, 56		1,855
57, 58, 59, 60	1,820	
61, 62, 63, 64		1,815
Total	16,255	15,265

These results are the same as in the tests where the rows were thinned to the same stand of stalks. The point of importance is that the seed kept in the dry house did not germinate any better than the seed kept in the crib, but produced 5 bushels more per acre.

The prevailing idea that the thing of most importance is to obtain a good stand of stalks must be discarded. Farmers must consider the productiveness of the stalks of more importance than the number. Full stands can be obtained by the heavy planting of weak seed. Good yields can not be obtained in this way. The most expensive seed to plant is that from which a stand of stalks can be obtained but

from which a good yield can not be obtained. The stand of stalks bears the same relation to the grain yield as the number of trees in an orchard bears to the amount of fruit produced. Productivity as well as quantity must be considered.

SUMMARY.

(1) The seed-corn situation in the spring of 1912 furnishes a good example of what has happened and is likely to happen again.

(2) The loss from planting neglected seed corn reduces or destroys the profit on the corn crop of each individual farmer and in the aggregate is an annual loss to the country of many millions of dollars.

(3) By the early selection of sufficient seed corn for several years' planting and its proper preservation these immense and oft-recurring losses can be prevented.

(4) By making germination tests of neglected seed and by heavy planting full stands can be obtained, but the yield may be 18 bushels per acre less than would have been harvested had the seed been selected early and well preserved.

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *April 10, 1912.*

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